

Bench-Top Type Temperature (& Humidity) Chamber

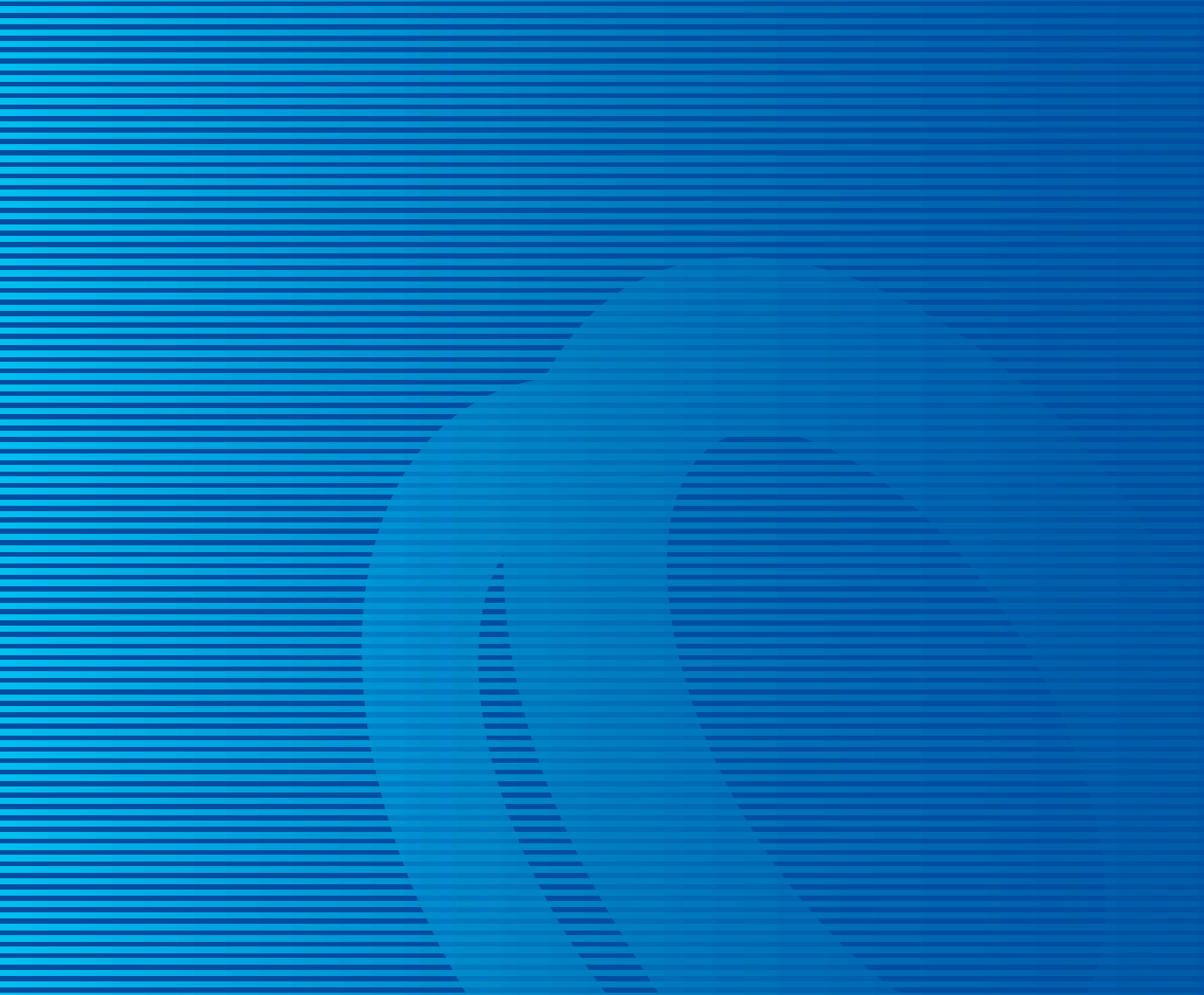
SH•SU
LH•LHL•LHU•LU



Compact design for personal use Ready to network with your computer.

Introducing a new lineup of our Bench-top Type Temperature (& Humidity) Chamber Series. Our latest models achieve superb performance in a compact size, and attains temperatures as low as -20°C / -40°C / -60°C , with capacity of 20L or 60L. They provide high performance and quality features with new capabilities for integration with our information network system,〈E-PILOT 21〉. It is useful for centralized control and data processing, as well as operating chamber control. All brought to you by ESPEC.







Testarea (60L model)

● Small size & light weight

Chamber size is a compact 440W × 560H × 695Dmm (excluding protrusion), while its weight is only 66kg. Ensured the inside test area dimension at 300W × 300H × 250Dmm. (SU-221・241 100V AC model) .

● Compact design with high performance — SH-661

The new model SH-661 achieves -60 to $+150^{\circ}\text{C}$ / 30 to 95%rh in a compact design, and shows outstanding performance than any other previous bench-top models.



Example of the Bench-Top Type Temp. (& Humid.) Chamber connected with the Ion Migration Evaluation System (sold separately)

● Select your optimum chamber from a full variation

The series provide six variations in temperature (& humidity) range of -20°C / -40°C / -60°C to $+150^{\circ}\text{C}$ (and 30 to 95%rh), and two capacities of 20L or 60L, with a total of 10 models altogether. A wide temperature (& humidity) range is offered in a bench-top model, enabling you to choose the right chamber.

*Please refer to page 9.

● Temperature (& Humidity) Cabinets LH, LHL, LHU, LU

These are reasonably-priced cabinets that can be used for a variety of purposes. They have a 105 L capacity and create a stable internal environment.

*Please refer to page 13 and 14.

● Evaluation of ion migration

Operating the Bench-Top Type Temp. (& Humid.) Chamber with ESPEC's Ion Migration Evaluation System (AMI) (sold separately) enables more precise ion migration evaluation.

Eco-friendly

- **Newly developed refrigeration system that saves energy consumption up to 55%**

Our exclusive refrigerator capacity variable control system saves up to 55% energy consumption compared to our previous model.

- **Optional stand for space-saving layout**

The L type and H type stands are available with casters so that you can move them easily. The taller H type stand allows you to store the shorter L type stand under it. Combining both stands, you can use them as a single stand to stack two chambers.

*When installing the stand, secure it to the floor with the earthquake-resistant fittings supplied with the stand for your safety.



L type and H type stands (optional)

- **Recycling**

Molded resin and metal parts which can be recycled are clearly marked to make recyclable materials easier to identify during disassembly.

- **Ozone layer protection**

The HFC refrigerant used is completely safe for the ozone layer.

- **Paperless Recording (optional)**

The paperless recorder makes it easy record the temperatures of different components, such as the chamber temperature, on a memory card (Compact Flash).



L type and H type stands (optional)



Cable port plug (Material marked)



Paperless recorder Portable type (optional)

User-friendly



● Cable ports for running in wires

Each one 25mm diameter cable port is standard equipped on both sides of the chamber for wiring to the specimen. We also provide 50mm, 100mm diameter port and flat type cable port.

● Cartridge tank for easy water supply

Once water is supplied into the tank, continuous operation is maintained for three days. Maintenance can be done easily from the front side. Additional water tank connection is available for further extended operation. (SH model)

● Right-opening door (optional)

You may want to change the direction of opening the door to fit the installation space.

● Viewing window for observation (optional)

A large window provides a clear view of your specimen during testing.
(215W × 215Hmm for 20L model,
215W × 315Hmm for 60L model)

*The basic specification of the chamber will be modified. Please refer to page 11.



Water supply tank



Right-opening door (optional)



Viewing window (optional)

● Flexible Computer Interface

Communication port RS-485 is equipped as standard. You can select RS-232C, GPIB, and E-BUS communication port as option.

Control operation



● Easy operation with 9 keys

Temperature & humidity setting and upper/lower temperature & humidity limit alarm setting can be done with simple key operation.

● Programming operation of up to 9 steps

In addition to constant setting, programming instrumentation is equipped to allow programmable operation to a maximum of 9 steps per pattern and the rise and fall gradient of temperature (& humidity) to be set to meet the application requirements for temperature characteristic testing and temperature (& humidity) cycle testing. Maximum 99-time repeat function and operational setting function after program execution are just two of the various functions offered.

● Network system E-PILOT 21 (Sold separately)

E-PILOT 21 is ESPEC's suite of networking tools for communicating between a computer and our environmental testing chambers. It enables the management of chamber operation and test settings from a remote location. Additionally, measurement data and system status can be constantly monitored and recorded on the computer.

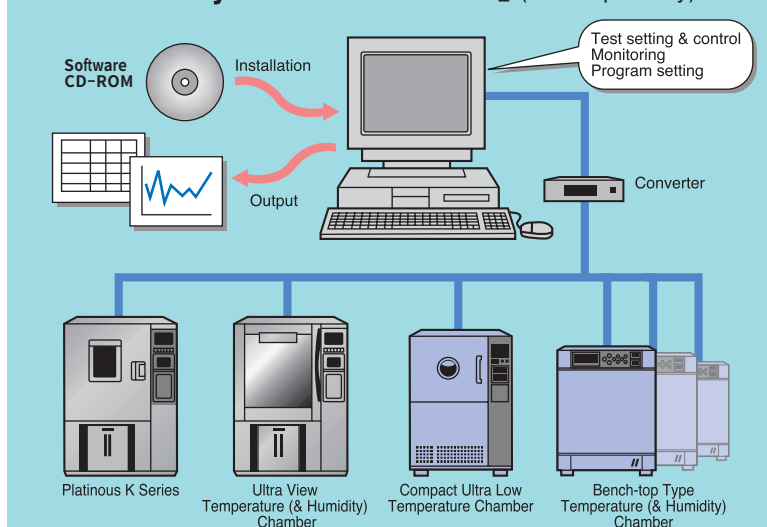
Description of program function

Program function	Pattern
Step program	
Temperature gradient program	
Termination program	1. HOLD 2. CONST 3. OFF

*1 Sets a program repetition frequency between a range of 1 and 99.

*2 Selects HOLD, CONST or OFF when a program is over.

● Network system 「E-PILOT 21」 (sold separately)



Model		SH-221	SH-241	SH-261	SH-641	SH-661
Power supply		100V AC 1ϕ 50/60Hz, 115V AC 1ϕ 60Hz 220V AC 1ϕ 50/60Hz, 230V AC 1ϕ 50Hz 230V AC 1ϕ 50Hz (Compliance with CE Marking)			100V AC 1ϕ 50/60Hz, 200V AC 1ϕ 50/60Hz 220V AC 1ϕ 50/60Hz, 230V AC 1ϕ 50Hz 230V AC 1ϕ 50Hz (Compliance with CE Marking)	
Maximum current *1	100V	12.5A		13.5A	18.0A	
	115V	12.0A		13.0A	—	
	200V	—			10.0A	
	220V	7.0A		7.5A	9.0A	
	230V	6.5A		7.0A	8.5A	
Temperature and humidity control system		Balanced Temperature & Humidity Control system (BTHC system)				
Operation temperature		+5 to +35°C (+41 to +95°F)				
Performance *2	Temperature range *3	−20 to +150°C (−4 to +302°F)	−40 to +150°C (−40 to +302°F)	−60 to +150°C (−76 to +302°F)	−40 to +150°C (−40 to +302°F)	−60 to +150°C (−76 to +302°F)
	Humidity range *3	30 to 95%rh (Refer to diagram of temperature & humidity control range)				
	Temperature fluctuation *3	±0.3°C (−20 to +100°C) [±0.54°F (−4 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−40 to +100°C) [±0.54°F (−40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−60 to +100°C) [±0.54°F (−76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−40 to +100°C) [±0.54°F (−40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−60 to +100°C) [±0.54°F (−76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]
	Humidity fluctuation *3	±3.0%rh				
	Temperature uniformity *3	±0.5°C (−20 to +100°C) [±0.9°F (−4 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−40 to +100°C) [±0.9°F (−40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−60 to +100°C) [±0.9°F (−76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−40 to +100°C) [±0.9°F (−40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−60 to +100°C) [±0.9°F (−76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]
	Humidity uniformity *3	±3.0%rh				
	Temperature heat-up rate	−20 to +150°C within 55 min.	−40 to +150°C within 60 min.	−60 to +150°C within 70 min.	−40 to +150°C within 70 min.	−60 to +150°C within 80 min.
	Temperature pull-down rate	+20 to −20°C within 20 min.	+20 to −40°C within 50 min.	+20 to −60°C within 70 min.	+20 to −40°C within 60 min.	+20 to −60°C within 90 min.
	Lowest attainable temperature	−20°C (−4°F)	−40°C (−40°F)	−60°C (−76°F)	−40°C (−40°F)	−60°C (−76°F)
	Construction	Exterior material	Painted steel			
Interior material		18-8 Cr-Ni stainless steel plate (SUS 304)				
Insulation		Rigid polyurethane foam, Glass wool				
Door		one-panel door (right handle, left hinge)				
Instrumentation panel		Temperature & humidity indicator controller, Overheat protector, Overcool protector				
Heater		Nichrome-stripped wire heater				
		400W			600W	
Humidifier		18-12-2.5 Cr-Ni-Mo stainless steel sheathed heater 250W				
Refrigeration system		Mechanical single-stage refrigerator system		Mechanical cascade condenser refrigeration system		
Cooler		Plate fin cooler				
Refrigerator		Compressor: Air-cooled hermetically sealed compressor, Condenser: Air-cooled condenser, Expansion mechanism: Capillary tube				
Refrigerator capacity		400W		400W+400W		
Refrigerant		R404A		R404A, R23		
Fittings	Connecting terminal for temp & humid recorder terminal, Specimen power supply control terminal, External alarm terminal, External output terminal, Cable ports, Power cord/ plug, Drain pipe, Water supply tank, Quick on/ off plug for water drainage, Water level sensor for water supply tank/ drain socket for tank					
Noise *4	55dB		59dB		61dB	
Heat exhaust	3500kJ/h		4000kJ/h		5040kJ/h	
Water supply	Tank capacity	Approx. 5.0L				
	Water quality	Conductivity 0.1 to 10μs/cm (Ultrapure water cannot be used.)				
Dimensions	Inside dimensions (W×H×D mm/ in)	300×300×250/ 11.8×11.8×9.8 (excluding protrusions)			400×400×400/ 15.7×15.7×15.7 (excluding protrusions)	
	Outside dimensions (W×H×D mm/ in)	440×630×695/ 17.3×24.8×27.4 (730/ 28.7D when including protrusions)		440×630×785/ 17.3×24.8×30.9 (825/ 32.5 when including protrusions)	540×730×890/ 21.3×28.7×35.0 (930/ 36.6D when including protrusions)	
Capacity (L)		22.5			64	
Weight (kg)		71 (76 for 115, 220, 230V)		100	122	

*1 At +23°C ambient temperature, value at stable voltage application. For SH-641/ 661, make sure to check the capability of your power equipment in advance.

*2 At +23°C ambient temperature, value at stable voltage application with no specimen. Lowest attainable temperature value at ambient of up to +30°C.

*3 In accordance with Standard for Performance of Humidity Chamber (JTM-K01-1998) of standard of Japan Testing Machinery Association.

*4 At 1m from front of chamber, 1.2m from floor (depending on environment)

Model		SU-221	SU-241	SU-261	SU-641	SU-661
Power supply		100V AC 1ϕ 50/60Hz, 115V AC 1ϕ 60Hz 220V AC 1ϕ 50/60Hz, 230V AC 1ϕ 50Hz 230V AC 1ϕ 50Hz (Compliance with CE Marking)			100V AC 1ϕ 50/60Hz, 200V AC 1ϕ 50/60Hz 220V AC 1ϕ 50/60Hz, 230V AC 1ϕ 50Hz 230V AC 1ϕ 50Hz (Compliance with CE Marking)	
Maximum current *1	100V	10.0A		13.5A	18.0A	
	115V	9.5A		13.0A	——	
	200V	——			10.0A	
	220V	6.0A		7.5A	9.0A	
	230V	5.5A		7.0A	8.5A	
Temperature control system		Balanced Temperature control system (BTC system)				
Operation temperature		+5 to +35°C (+41 to +95°F)				
Performance *2	Temperature range *3	−20 to +150°C (−4 to +302°F)	−40 to +150°C (−40 to +302°F)	−60 to +150°C (−76 to +302°F)	−40 to +150°C (−40 to +302°F)	−60 to +150°C (−76 to +302°F)
	Temperature fluctuation *3	±0.3°C (−20 to +100°C) [±0.54°F (−4 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−40 to +100°C) [±0.54°F (−40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−60 to +100°C) [±0.54°F (−76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−40 to +100°C) [±0.54°F (−40 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]	±0.3°C (−60 to +100°C) [±0.54°F (−76 to +212°F)] ±0.5°C (+100.1 to +150°C) [±0.9°F (+212.1 to +302°F)]
	Temperature uniformity *3	±0.5°C (−20 to +100°C) [±0.9°F (−4 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−40 to +100°C) [±0.9°F (−40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−60 to +100°C) [±0.9°F (−76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−40 to +100°C) [±0.9°F (−40 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]	±0.5°C (−60 to +100°C) [±0.9°F (−76 to +212°F)] ±0.8°C (+100.1 to +150°C) [±1.44°F (+212.1 to +302°F)]
	Temperature heat-up rate	−20 to +150°C within 55 min.	−40 to +150°C within 60 min.	−60 to +150°C within 70 min.	−40 to +150°C within 70 min.	−60 to +150°C within 80 min.
	Temperature pull-down rate	+20 to −20°C within 20 min.	+20 to −40°C within 50 min.	+20 to −60°C within 70 min.	+20 to −40°C within 60 min.	+20 to −60°C within 90 min.
	Lowest attainable temperature	−20°C (−4°F)	−40°C (−40°F)	−60°C (−76°F)	−40°C (−40°F)	−60°C (−76°F)
	Construction	Exterior material	Painted steel			
Interior material		18-8 Cr-Ni stainless steel plate (SUS 304)				
Insulation		Rigid polyurethane foam, Glass wool				
Door		one-panel door (right handle, left hinge)				
Instrumentation panel		Temperature indicator controller, Overheat protector, Overcool protector				
Heater		Nichrome-stripped wire heater 400W			600W	
Refrigeration system		Mechanical single-stage refrigerator system		Mechanical cascade condenser refrigeration system		
Cooler		Plate fin cooler				
Refrigerator		Compressor: Air-cooled hermetically sealed compressor, Condenser: Air-cooled condenser, Expansion mechanism: Capillary tube				
Refrigerator capacity		400W		400W + 400W		
Refrigerant		R404A		R404A, R23		
Fittings		Connecting terminal for temp recorder terminal, Specimen power supply control terminal External alarm terminal, External output terminal, Cable ports, Power cord/ plug, Drain pipe				
Noise *4		55dB		59dB	61dB	
Heat exhaust		3500kJ/h		4000kJ/h	5040kJ/h	
Dimensions	Inside dimensions (W×H×D mm/ in)	300×300×250/ 11.8×11.8×9.8 (excluding protrusions)			400×400×400/ 15.7×15.7×15.7 (excluding protrusions)	
	Outside dimensions (W×H×D mm/ in)	440×560×695/ 17.3×22.0×27.4 (730/ 28.7D when including protrusions)		440×560×785/ 17.3×22.0×30.9 (825/ 32.5 when including protrusions)	540×660×890/ 21.3×26.0×35.0 (930/ 36.6D when including protrusions)	
Capacity (L)		22.5			64	
Weight (kg)		66 (71 for 115, 220, 230V)		95	115	

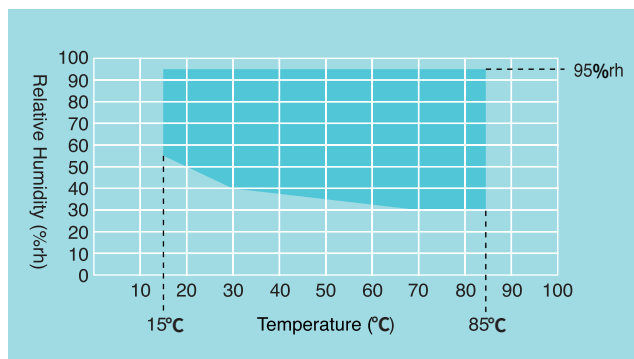
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*2 At +23°C ambient temperature, value at stable voltage application with no specimen. Lowest attainable temperature value at ambient of up to +30°C.

*3 In accordance with Standard for Performance of Humidity Chamber (JTM-K01-1998) of standard of Japan Testing Machinery Association.

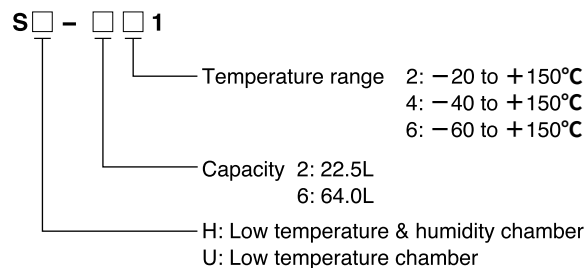
*4 At 1m from front of chamber, 1.2m from floor (depending on environment)

TEMPERATURE & HUMIDITY CONTROL RANGE (SH)



* At +23°C ambient temperature.

MODEL



SAFETY DEVICES

- Leakage breaker for power supply
- Thermal fuse
- Boil dry protector (SH only)
- Short circuit protection fuse for control circuit
- Overheat protector
- Overcool protector
- Air circulator temperature switch
- Specimen power supply control terminals
- Refrigerator overload relay
- Inside chamber door switch
- Upper and lower temperature & humidity limit alarms (built inside temperature & humidity controller)
- Sensor burn-out detection circuit (built inside temperature & humidity controller)
- Watchdog timer (built inside temperature & humidity controller)
- Refrigerator automatic delay circuit (built inside temperature & humidity controller)



● Do not use specimens which are explosive or inflammable, or which contain such substances. To do so could be hazardous, as this may lead to fire or explosion.



● Do not place corrosive materials in the chamber. If corrosive substances or liquid is used, the life of the unit may be significantly shortened specifically because of the corrosion of stainless steel, resin and silicone materials.

● Do not place life forms or substances that exceed allowable heat generation.

Be sure to read the instruction manual before operation.

TEMPERATURE (& HUMIDITY) PROGRAM INDICATOR CONTROLLER

Model	ES-102
Operation mode	Program operation, Constant operation
Display	7-segment LED display
Setting	Mechanical key input
Program capacity	9 steps/ 1 pattern (1 to 99 repetitions)
Setting and indication ranges	Temp. : -25 to +155°C (SH-221, SU-221) : -45 to +155°C (SH-241·641, SU-241·641) : -65 to +155°C (SH-261·661, SU-261·661) Humid. : 0 to 100 %rh (SH only) Time : 0 to 99 hours 59 minutes, 100 to 999 hours
Setting and indication resolution	Temp. : 0.1°C Humid.: 1%rh (SH only) Time : 1 minute (in one hour unit for over 100 hours)
Indication accuracy *	Temp. : 0.5°C (Typ.) Humid.: ±2%rh (Typ.) (SH only) Time : within 30 sec. per month
Input	Thermocouple type T (Copper/ Copper-Nickel)
Control	PID control
Communication function	RS-485
Auxiliary functions	Input burn-out detection function Upper and lower temp. (& humid.) limit alarm function Self-diagnostic function (watchdog timer) Alarm indication function Power failure protection function Refrigerator capacity automatic control function
Battery	Lithium battery, 1

* At +23°C ±5°C ambient temperature

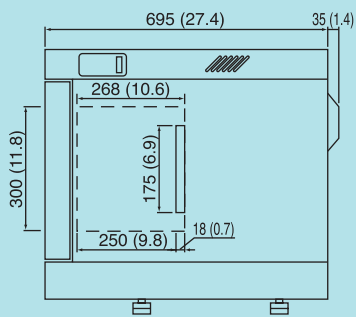
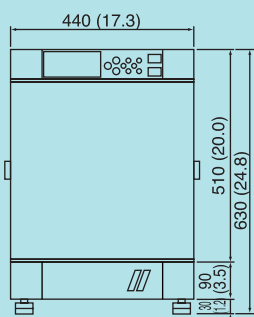
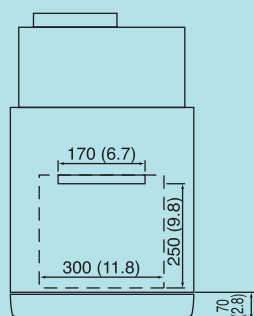
ACCESSORIES

- Shelf 1
Load capacity (uniformly distributed load)
SH/ SU-221, 241, 261 500g
SH/ SU-641, 661 5kg
Number of shelves
SH/ SU-221, 241, 261 5 (Shelf pitch 35mm)
SH/ SU-641, 661 5 (Shelf pitch 50mm)
- Connector
2P for connecting terminal for temp. & humid. recorder 2 (1 for SU)
6P for connecting signal terminal 1
- Cable port plug 2
- Cartridge fuse 1
- Socket adaptor (100V AC, 115V AC only) 1
(for SH/ SU-221, 241, 261)
- Wet-bulb wick 1 box (SH only)
- Humidifying tray drain hose 2m 1 (SH only)
- Water tank level sensor tank drain hose 0.3m 1 (SH only)
- User's Manual 1

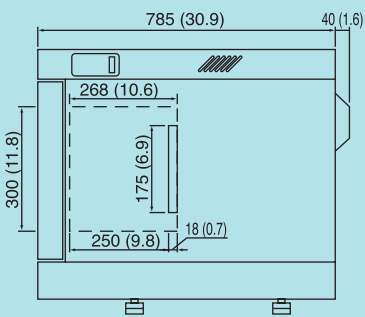
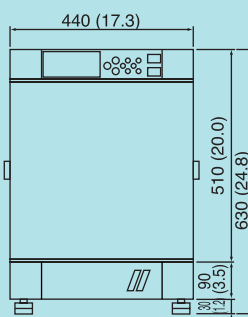
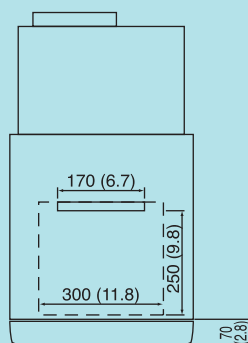
DIMENSIONS

unit : mm (inch)

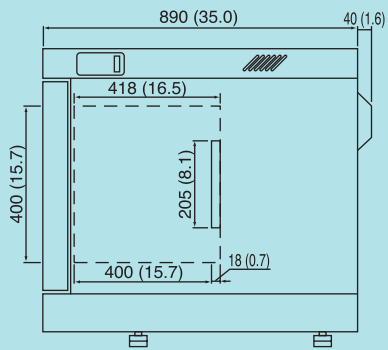
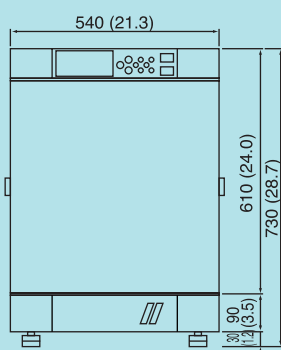
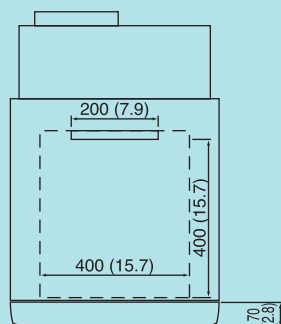
● SH-221・241



● SH-261



● SH-641・661



OPTIONS

Paperless recorder

Records temperature of each section such as the temperature inside the chamber.

[Temperature type]

Temperature range: -100 to $+200^{\circ}\text{C}$

Number of inputs (Initial setting):

Temperature 1

(5 more channels can be turned ON)

Data saving cycle: 5 sec

Portable type

External recording media:

CF memory card (32MB)

Language support: ENG, JPN, CHN

[Temperature and humidity type]

Temperature range: -50 to $+150^{\circ}\text{C}$

-100 to $+150^{\circ}\text{C}$

Humidity range: 0 to 100%rh

Number of inputs (Initial setting):

Temperature 1 / Humidity 1

(4 more channels can be turned ON)

Data saving cycle: 5 sec

Portable type

External recording media:

CF memory cord (32MB)

Language support: ENG, JPN, CHN



Paperless recorder Portable type

Temperature recorder

SRJ25 • -100 to $+200^{\circ}\text{C}$

• 100mm

• Portable type

• 6 dots

• Thermocouple type T

(Copper/ Copper-Nickel)

• Digital

• Free power supply

(100V AC to 240V AC)

Temperature & humidity recorder

SRJ14 -100 to $+150^{\circ}\text{C}/$

0 to 100%rh (for SH)

SRJ12 -50 to $+150^{\circ}\text{C}/$

0 to 100%rh (for SH)

• 100mm

• Portable type

• 6 dots

(Temperature: 5 dots

Thermocouple type T

(Copper/ Copper-Nickel)

Humidity: 1 dot

DC1 to 5V

• Digital

• Free power supply

(100VAC to 240VAC)



Wet-bulb temperature detecting terminal

Detects wet-bulb temperature inside the chamber. Equal electromotive force as Thermocouple type T (Copper/ Copper-Nickel).

Equipped with connector.

*Not available for SU

Thermocouple

Measures the temperature of specimens

• T (Copper/ Copper-Nickel)

• 2, 4, 6m

Inner door

A glass door is provided inside the chamber door for observation.

* A wiper is equipped for the SH model.



SU model

Viewing window

A window is installed on chamber door.

SH-221•241•261 W215×H215mm

SU-221•241•261 W215×H215mm

SH-641•661 W215×H315mm

SU-641•661 W215×H315mm

*In accordance with addition of the viewing window, standard specification will be changed as follows.

Temperature uniformity :

$\pm 1.0^{\circ}\text{C}$ (-20 to $+100^{\circ}\text{C}$)

$\pm 1.5^{\circ}\text{C}$ ($+100.1$ to $+150^{\circ}\text{C}$)

Humidity uniformity : $\pm 5.0\%$ rh

Temperature heat-up rate :

standard rate +10 min or less

Temperature pull-down rate :

standard rate +10 min or less

($+20$ to -35°C)

standard rate +30 min or less

($+20$ to -60°C)



W215×H215mm

Right-opening door

Door can be exchanged to a right hinged door.

*Not available with inner glass door option.



OPTIONS

Cable port

Additional cable ports are provided on the wall of chamber.

- 25, 50, 100mm diameter
- Flat cable port

*One silicon sponge rubber port plug is equipped per one cable port.

* Basic specification of the chamber may not be effective when equipped with a cable port.



25mm diameter type

flat type

Cable port rubber plug

The additional silicon sponge rubber port plug .

Shelf

Auxiliary shelves on request.

SH/ SU-221•241•261

- Effective size 200W×150Dmm
- Load capacity (uniformly distributed load) 500g

SH/ SU-641•661

- Effective size 300W×300Dmm
- Load capacity (uniformly distributed load) 5kg

Specimen basket

- Size 206W×40H×156D mm
- Material 18-8 Cr-Ni stainless steel, 5 mesh metal basket



Stand

This stand enhances mobility of the chamber and ease the work to load/unload the specimen.

Combining the L type and H type stands allows you to use them as a single stand to stack two chambers.

* Be sure to secure the stand onto the floor with earthquake resistant fittings.

SH/ SU-221•241•261

- L type : 440W×450H×750Dmm
- H type : 630W×1140H×815Dmm

SH/ SU-641•661

- L type : 540W×350H×860Dmm
- H type : 730W×1140H×925Dmm



L type stand



Two chambers stacked (L type and H type stands)

Auxiliary water tank circuit (for SH)

Automatic water supply circuit is equipped to replenish the standard tank from the auxiliary water tank.

- Supply water quality pure water (electrical conductivity 0.1 to 10 μ S/cm)
- Water supply pressure 4.9 to 19.6KPa (Gauge)

Auxiliary water tank (for SH)

Auxiliary tanks are provided to replenish water to the standard tank.

Tray for auxiliary water tank (for SH)

Protects water from leaking while supplying water from the auxiliary water tank.

Communication functions

Computer interface

- GPIB
- RS-232C
- E-BUS

*Select one other than standard RS-485.

Communication cable

- RS-485 5, 10m
- GPIB 2, 4m
- RS-232C 1.5, 3, 5m
- E-BUS 1.5, 3, 5m for extension
- E-BUS 5, 10m

LH·LHL·LHU·LU

(Low) Temperature & Humidity Cabinet & Low Temperature Cabinet



LU-113, LHU-113

Temperature & humidity indicator-controller (for LHU-113)

Model	ES-102
Operating mode	Program operation, constant operation
Display	7 segment LED display
Setting	Mechanical key input
Program memory capacity	9 steps per pattern (Repetition: 1 to 99 times)
Setting and indication ranges	Temperature: -25 to $+90^{\circ}\text{C}$ (-13 to $+194^{\circ}\text{F}$) Humidity: 0 to 100%rh Time: 0 to 99hrs 59min. 100 to 999hrs.
Setting and indication resolution	Temperature: 0.1°C (0.18°F) Humidity: 1%rh Time: 1minute (1hour for 100hrs. or more)
Indication accuracy	Temperature: $\pm 0.5^{\circ}\text{C}$ (typ.) ($\pm 0.9^{\circ}\text{F}$) Humidity: $\pm 2\%$ rh (typ.) Time: within 30 seconds per month
Input	Thermocouple type T (Copper/ Copper-Nickel)
Control	PID control
Communications (Options)	RS-485, GPIB, RS-232C, E-BUS
Auxiliary functions	• Input burn-out detection function • Upper and lower temp. & humid. limit alarm function • Self-diagnostic function (watchdog timer) • Alarm indication function • Power cut protection function • Refrigerator capacity automatic control

*Specifications differ according to the models. For further information, please contact us.

● A stable internal environment

These bench-top temperature and humidity cabinets are ideal for laboratories and research facilities (LH/ LHL/ LHU). They have a wide temperature and humidity control range, and their temperature and humidity uniformity create a precise internal environment.

● Refrigeration unit achieves temperatures down to -20°C

The low temperature (& humidity) cabinets incorporate an air-cooled refrigerator (LHU/ LU). It delivers a wide temperature range from -20°C to $+85^{\circ}\text{C}$. They also have an insulated cabinet, a circulating fan, and efficient heaters to ensure a stable temperature environment.

● PID control temperature (& humidity) controller

The PID controlled electronic temperature (& humidity) controller provides automatic control of all operations once the desired temperature (& humidity) is set.

● Program operation

'Constant' or 'program' operation can be selected on the installed instrumentation. Program operation can run up to 9 steps per pattern and can specify ramp time for each step. A display is equipped to show the conditions and remaining time during operation.

● Upper temperature limit deviation warning

When the temperature is set, the warning function is automatically set to activate at $+10^{\circ}\text{C}$ (adjustable) above the preset temperature.

● Complete safety features

In addition to a ground leakage breaker, which also protects against overcurrent, every model features an overheat protector or thermal fuse as a secondary safety device to provide added protection.

SPECIFICATIONS

Model		LH-113	LHL-113	LHU-113	LU-113
System		Balanced temperature & humidity control system (BTHC system)			Balanced temperature control system (BTC system)
Power supply/ Maximum current		100V AC 1ϕ 50/60Hz 15A, 115V AC 1ϕ 60Hz 13A, 220V AC 1ϕ 50/60Hz 7A, 230V AC 1ϕ 50/60Hz 6.5A			100V AC 1ϕ 50/60Hz 9A, 115V AC 1ϕ 60Hz 8A, 220V AC 1ϕ 50/60Hz 4.1A, 230V AC 1ϕ 50/60Hz 3.9A
Operating temperature		0 to +40°C(+32 to +104°F)			
Performance ^{*1}	Temp. (& humid.) control range	(Ambient+10)°C to +85°C (185°F)/ 45 to 95%rh	+5 to +85°C (+41 to +185°F)/ 40 to 95%rh	−20 to +85°C (−4 to +185°F)/ 40 to 95%rh	−20 to +85°C (−4 to +185°F)
	Temp. (& humid.) fluctuation	±0.5°C (±0.9°F)/ ±3%rh			±0.5°C (±0.9°F)
	Temp. (& humid.) uniformity	±2.0°C (±3.6°F)/ ±6%rh			±2.0°C (±3.6°F)
Construction	External material	Painted steel (melamine coating)			
	Internal material	18-8 Cr-Ni stainless steel plate (2B polish)			
Air circulator		Propeller fan			
Heater		Sheathed heater with fin			
Humidifier		Sheathed heater			_____
Refrigerator		_____	Air-cooled hermetically sealed compressor (HFC134a)		
Fittings		Drain port filter, cable port (ϕ25mm), power cord			
Accessories		(2)Shelf (Stainless steel wire), (2)Shelf bracket (18-8 Cr-Ni stainless steel), Water supply and drain hose *2 (Hose with quick coupling ϕ8mm), Wet-bulb wick *2 (24pcs/ box), Brush *2 (for cleaning humidifying tray), Socket adapter (100V,115V AC spec. only), User's Manual			
Capacity		105L			
Inside dimensions *3		500W×600H×390D mm (19.7W×23.6H×15.4D inch)			
Outside dimensions *3		650W×1090H×805D mm (25.6W×42.9H×31.7D inch)			
Weight		85kg	95kg	100kg	90kg
Safety devices		Leakage breaker for power supply, Boil dry protector *2, Thermal fuse, Refrigerator overload relay *4, Upper and lower temperature & humidity limit alarms, Burn-out detection circuit, Watchdog timer, Air circulator temperature switch, Refrigerator automatic delay circuit *4, Overheat protector, Float switch for protecting electromagnetic pump *2			

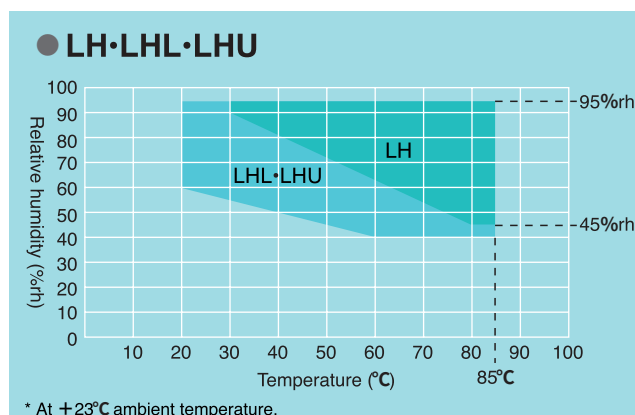
^{*1} Figures for an ambient temperature of +23°C with no specimen in the chamber. The performance is according to JTM K 01-1998 of Japan Testing Machinery Association.

^{*2} Except LU type.

^{*3} Excluding protrusions.

^{*4} Except LH type.

TEMPERATURE & HUMIDITY CONTROL RANGE



[NOTE] The LH-113 is not equipped with a dehumidifying refrigerator. Therefore, the temperature and humidity control range, especially the low humidity range shown here, may fluctuate depending on the installed conditions and environment (such as ventilation, fluctuations in ambient temperature, and other factors).

OPTIONS

- Specimen power supply control terminal
- Communication functions (RS-485, GPIB, RS-232C, E-BUS)

• Communication cable	RS-485	5, 10m
	GPIB	2, 4m
	RS-232C	1.5, 3, 5m
	E-BUS	5, 10m
- Thermocouple
- Inner door
- Shelf/ Shelf bracket
- Chamber stand
- Caster
- Cable port
- Rubber plug for cable port
- Portable water supply tank (except LU)
- Wet-bulb wick (except LU)
- Special spare parts

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